Complete Summary

GUIDELINE TITLE

Guideline on use of local anesthesia for pediatric dental patients.

BIBLIOGRAPHIC SOURCE(S)

American Academy of Pediatric Dentistry (AAPD). Guideline on use of local anesthesia for pediatric dental patients. Chicago (IL): American Academy of Pediatric Dentistry (AAPD); 2009. 7 p. [42 references]

GUIDELINE STATUS

This is the current release of the guideline.

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COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Pain during delivery of oral health care

GUIDELINE CATEGORY

Management
Treatment

CLINICAL SPECIALTY

Anesthesiology
Dentistry
Pediatrics

INTENDED USERS

Dentists

GUIDELINE OBJECTIVE(S)

To help practitioners make decisions when using local anesthesia to control pain in infants, children, adolescents, andÂ individuals with special health care needs during the delivery of oral health care

TARGET POPULATION

Infants, children, adolescents, and individuals with special health care needs undergoing dental procedures

INTERVENTIONS AND PRACTICES CONSIDERED

1. Topical anesthetics, such as lidocaine and benzocaine
2. Injectable local anesthetics and vasoconstrictors
    - Lidocaine
    - Mepivacaine
    - Articaine
    - Prilocaine
    - Bupivacaine
    - Epinephrine
    - Norepinephrine
    - Levonordefrin
3. Selection of syringes and needles
4. Documentation of local anesthesia administration
5. Supplemental injection techniques
    - Computer-controlled local anesthetic delivery
    - Periodontal injection techniques (i.e., periodontal ligament [PDL], intraligamentary, and peridental injection)
    - "Needle-less" systems
    - Intraseptal or intrapulpal injection
6. Emergency and complication management
7. Administration of local anesthesia with sedation, general anesthesia, and/or nitrous oxide/oxygen analgesia/anxiolysis

MAJOR OUTCOMES CONSIDERED

- Level of pain
- Side effects of local anesthetic administration

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

This revision included a new systematic literature search of the MEDLINE/PubMed electronic database using the following parameters:

- Terms: dental anesthesia, dental local anesthesia, and topical anesthesia
- Field: all fields
- Limits: within the last 10 years, humans, English, and clinical trials

One thousand one hundred thirty articles matched these criteria. Papers for review were chosen from this list and from references within selected articles.

NUMBER OF SOURCE DOCUMENTS

1130 articles matched the criteria.

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Expert Consensus (Committee)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

The oral health policies and clinical guidelines of the American Academy of Pediatric Dentistry (AAPD) are developed under the direction of the Board of Trustees, utilizing the resources and expertise of its membership operating through the Council on Clinical Affairs (CCA).

Proposals to develop or modify policies and guidelines may originate from 4 sources:

1. The officers or trustees acting at any meeting of the Board of Trustees
2. A council, committee, or task force in its report to the Board of Trustees
3. Any member of the AAPD acting through the Reference Committee hearing of the General Assembly at the Annual Session
4. Officers, trustees, council and committee chairs, or other participants at the AAPD's Annual Strategic Planning Session

Regardless of the source, proposals are considered carefully, and those deemed sufficiently meritorious by a majority vote of the Board of Trustees are referred to the CCA for development or review/revision.

Once a charge (directive from the Board of Trustees) for development or review/revision of an oral health policy or clinical guideline is sent to the CCA, it is assigned to 1 or more members of the CCA for completion. CCA members are instructed to follow the specified format for a policy or guideline. All oral health policies and clinical guidelines are based on 2 sources of evidence: (1) the scientific literature; and (2) experts in the field. Members may call upon any expert as a consultant to the council to provide expert opinion. The Council on Scientific Affairs provides input as to the scientific validity of a policy or guideline.

The CCA meets on an interim basis (midwinter) to discuss proposed oral health policies and clinical guidelines. Each new or reviewed/revised policy and guideline is reviewed, discussed, and confirmed by the entire council.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Once developed by the Council on Clinical Affairs (CCA), the proposed policy or guideline is submitted for the consideration of the Board of Trustees. While the board may request revision, in which case it is returned to the council for modification, once accepted by majority vote of the board, it is referred for Reference Committee hearing at the upcoming Annual Session. At the Reference Committee hearing, the membership may provide comment or suggestion for alteration of the document before presentation to the General Assembly. The final document then is presented for ratification by a majority vote of the membership present and voting at the General Assembly. If accepted by the General Assembly, either as proposed or as amended by that body, the document then becomes the official American Academy of Pediatric Dentistry (AAPD) oral health

policy or clinical guideline for publication in the AAPD's Reference Manual and on the AAPD's Web site.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Topical Anesthetics

- Topical anesthetic may be used prior to the injection of a local anesthetic to reduce discomfort associated with needle penetration.
- The pharmacological properties of the topical agent should be understood.
- A metered spray is suggested if an aerosol preparation is selected.
- Systemic absorption ofÃ the drugsÂ in topical anesthetics must be considered when calculating the total amount of anesthetic administered.

Selection of Syringes and Needles

- For the administration of local dental anesthesia, dentists should select aspirating syringes that meet theÂ American Dental Association (ADA) standards.
- Short needles may be used for any injection in which the thickness of soft tissue is less than 20 mm.Â A long needle for a deeper injection into soft tissue (Malamed, "The needle," 2004). Any 23- through 30-gauge needle may be used for intraoral injections since blood can be aspirated through all of them.Â Aspiration can be more difficult, however,Â when smaller gauge needles are used (Malamed, "The needle," 2004). An extra-short, 30-gauge is appropriate for infiltration injections (Malamed, "The needle," 2004).
- Needles should not be bentÂ if they are to beÂ inserted into soft tissue to a depth of >5 mm or inserted to their hub for injections to avoid needle breakage (Malamed, "The needle," 2004).

Injectable Local Anesthetic Agents

- Selection of local anesthetic agents should be based upon:
    - The patient's medical history and mental/developmental status
    - The anticipated duration of the dental procedure
    - The need for hemorrhage control
    - The planned administration of other agents (e.g., nitrous oxide, sedative agents, general anesthesia)
    - The practitioner's knowledge of the anesthetic agent
- Use of vasoconstrictors in local anesthetics is recommended to decrease the risk of toxicity of the anesthetic agent, especially when treatment extends to 2 or more quadrants in a single visit.
- In cases of bisulfate allergy, use of a local anesthetic without vasoconstrictor is indicated. Local anesthetic without vasoconstrictor also can be used for shorter treatment needs but should be used with caution to minimize the risk of toxicity of the anesthetic agents.
- The established maximum dosage for any anesthetic should not be exceeded.

See Tables 1 and 2 in the original guideline document for injectable local anesthetics, their maximum dosages, and the dosage per dental cartridge.

Documentation of Local Anesthesia

- Documentation must include the type and dosage of local anesthetic. Dosage of vasoconstrictors, if any, must be notedÂ (e.g., 34 mg lidocaine with 0.017 mg epinephrine or 34 mg lidocaine with 1:100,000 epinephrine) (Malamed, "Basic injection technique," 2004).
- Documentation may include the type of injection(s) given (e.g., infiltration, block, intraosseous), needle selection, and patient's reaction to the injection.
- If the local anesthetic was administered in conjunction with sedative drugs, the doses of all agents must be noted on a time-based record.
- In patients for whom the maximum dosage of local anesthetic may be a concern, the weight should be documented preoperatively.
- Documentation should include that post-injection instructionsÂ were reviewed with the patient and parent.

Local Anesthetic Complications

- Practitioners who utilize any type of local anesthetic in a pediatric dental patient shall possess appropriate training and skills and have available the proper facilities, personnel, and equipment to manage any reasonably foreseeable emergency.
- Care should be taken to ensure proper needle placement during the intraoral administration of local anesthetics. Practitioners should aspirate before every injection and inject slowly.
- After the injection, the doctor, hygienist, or assistant should remain with the patient while the anesthetic begins to take effect.
- Residual soft tissue anesthesia should be minimized in pediatric and special health care needs patients to decrease risk of self-inflicted post-operative injuries.
- Practitioners should advise patients and their caregivers regarding appropriate behavioral precautions (e.g., do not bite or suck on lip/cheek, do not ingest hot substances) and the possibility of soft tissue trauma following the administration of local anesthesia. Placing a cotton roll in the mucobuccal fold may help prevent injury, and lubricating the lips with petroleum jelly helps prevent drying (Malamed, "Anatomical considerations", 2004).Â Practitioners who use phentolamine mesylate injections to reduce the duration of local anesthesia still should follow these recommendations.

Supplemental Injections to Obtain Local Anesthesia

- Alternative techniques for the delivery of local anesthesia may be considered to minimize the dose of anesthetic used, improve patient comfort, and/or improve successful dental anesthesia.

Local Anesthesia with Sedation, General Anesthesia, and/or Nitrous Oxide/Oxygen Analgesia/Anxiolysis

- Particular attention should be paid to local anesthetic doses used in children. To avoid excessive doses for the patient who is going to be sedated, a maximum recommended dose based upon weight should be calculated.
- The dosage of local anesthetic should not be altered if nitrous oxide/oxygen analgesia/anxiolysis is administered.
- When general anesthesia is employed, local anesthesia may be used to reduce the maintenance dosage of the anesthetic drugs. The anesthesiologist should be informed of the type and dosage of the local anesthetic used. Recovery room personnel also should be informed.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

REFERENCES SUPPORTING THE RECOMMENDATIONS

References open in a new window

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

All oral health policies and clinical guidelines are based on 2 sources of evidence: (1) the scientific literature; and (2) experts in the field.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Appropriate use of local anesthesia in pediatric patients and patients with special health care needs prevents pain duringÂ dental procedures, builds trust, allays fear and anxiety, and promotes a positive dental attitude.

POTENTIAL HARMS

- Side effects and toxicities of local anesthetics, epinephrine, and levonordefrin include central nervous system and cardiovascular toxicity during overdose, allergic reactions, paresthesia, and post operative soft tissue injury.
- An end product of prilocaine metabolism can induce formation of methemoglobin, reducing the oxygen carrying capacity of the blood. In patients with subclinical methemoglobinemia or with toxic doses (>6mg/kg), prilocaine can induce methemoglobinemia symptoms (e.g., grey or slate blue cyanosis of lips, mucous membranes, and nails; respiratory and circulatory distress).
- Accidental lip or cheek trauma can occur.
- If a local anesthetic is injected into an area of infection, its onset will be delayed or even prevented and inserting a needle into an active site of infection also could lead to possible spread of the infection.
- Local anesthetics without vasoconstrictors should be used with caution due to rapid systemic absorption which may result in overdose.

- Compounded topical anesthetics contain high doses of both amide and ester agents and are at risk for side effects. The US Food and Drug Administration does not regulate compounded topical anesthetics and recently issued warning about their use.
- Needle breakage is a rare occurrence. The primary cause of needle breakage is weakening the needle due to bending it before insertion into the soft tissues; another cause is patient movement after the needle is already inserted.

CONTRAINDICATIONS

CONTRAINDICATIONS

- Epinephrine is contraindicated in hyperthyroid patients.
- Levonordefrin and norepinephrine are absolutely contraindicated in patients receiving tricyclic antidepressants since dysrhythmias may occur (epinephrine dose should be kept to a minimum).
- Absolute contraindications for local anesthetics include a documented local anesthetic allergy (allergy to 1 amide does not rule out the use of another amide, but allergy to 1 ester rules out use of another ester).
- A bisulfate preservative is used in local anesthetics containing epinephrine. For patients having an allergy to bisulfates, use of a local anesthetic without vasoconstrictor is indicated.
- Intraosseous techniques may be contraindicated with primary teeth due to potential for damage to developing permanent teeth.
- The use of the periodontal ligament injection or intraosseous methods is contraindicated in the presence of inflammation or infection at the injection site.
- Prilocaine may be contraindicated in patients with methemoglobinemia, sickle cell anemia, anemia, or symptoms of hypoxia or in patients receiving acetaminophen or phenacetin, since both medications elevate methemoglobin levels.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Chart Documentation/Checklists/Forms
Resources

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Staying Healthy

IOM DOMAIN

Effectiveness
Safety

IDENTIFYING INFORMATION AND AVAILABILITY

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ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2005 (revised 2009)

GUIDELINE DEVELOPER(S)

American Academy of Pediatric Dentistry - Professional Association

SOURCE(S) OF FUNDING

American Academy of Pediatric Dentistry

GUIDELINE COMMITTEE

Council on Clinical Affairs

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

The Council on Clinical Affairs (CCA) is comprised of individuals representing the six geographical (trustee) districts of the American Academy of Pediatric Dentistry (AAPD), along with additional consultants confirmed by the Board of Trustees. CCA collaborates with the AAPD Council on Scientific Affairs.

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Council members and consultants derive no financial compensation from the American Academy of Pediatric Dentistry (AAPD) for their participation and are asked to disclose potential conflicts of interest. No conflicts were identified.

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GUIDELINE AVAILABILITY

Electronic copies: Available from the American Academy of Pediatric Dentistry Web site.

Print copies: Available from the American Academy of Pediatric Dentistry, 211 East Chicago Avenue, Suite 700, Chicago, Illinois 60611

AVAILABILITY OF COMPANION DOCUMENTS

Information about the American Academy of Pediatric Dentistry (AAPD) mission and guideline development process is available on the AAPD Web site.

The following implementation tools are available for download from the AAPD Web site:

- Dental growth and development chart
- American Academy of Pediatric Dentistry Caries-Risk Assessment Tool (CAT)

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI on August 19, 2005. This summary was updated by ECRI on February 21, 2006 following the U.S. Food and Drug Administration (FDA) advisory on benzocaine sprays. This summary was updated by ECRI Institute on March 10, 2009, following the U.S. Food and Drug Administration advisory on Topical Anesthetics. This summary was updated by ECRI Institute on February 22, 2010. The updated information was verified by the guideline developer on March 22, 2010.

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